



Federal Agency for  
Cartography and Geodesy

# **IVS combination center at BKG – ITRF2013 preparations and source position combination**

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# ITRF2013 preparations I

- Call for participation sent out in March 2013
- Proposed deadline for all services: February 10, 2014.
- Postponed by IVS due to analysis software developments and preparation issues.
- Side note: none of the other services submitted a contribution to ITRF2013 until now.

# ITRF2013 preparations II

- Overall amount of ~6000 24h sessions
- Several Analysis Centers announced their participations, including some new institutions.
- 9-10 contributions are estimated for the combination.
  - total amount of ~54 000 – 60 000 sessions
- Several discussions on submission instructions, axis offsets, EOP parameterization and source position handling.
- First test files available on the IVS data center on February 10, 2014.
- Other submissions are following shortly.

# ITRF2013 preparations

## - Combination process -

- Overall combination process close to the operational quarterly combination.
- Parameters: station coordinates and Earth orientation parameters (EOP)
- Source positions left out – further investigations foreseen for post-ITRF2013 era.
- Robust outlier tests for station coordinates and EOP based on Least-Median-of-Squares method.

# ITRF2013 preparations

## - Combination process -

- Variance-component estimation: group-wise software packages (Calc/Solve, QUASAR, OCCAM (LSM, LSC), GEOSAT, VieVS)

## **New institutions**

- Several tests with contributions from new institutions:
  - AUS (Australia)
  - NMA (Norway)
  - VIE (Austria)
- Iterative development of e.g. format issues, parameterization and modeling.

# First results

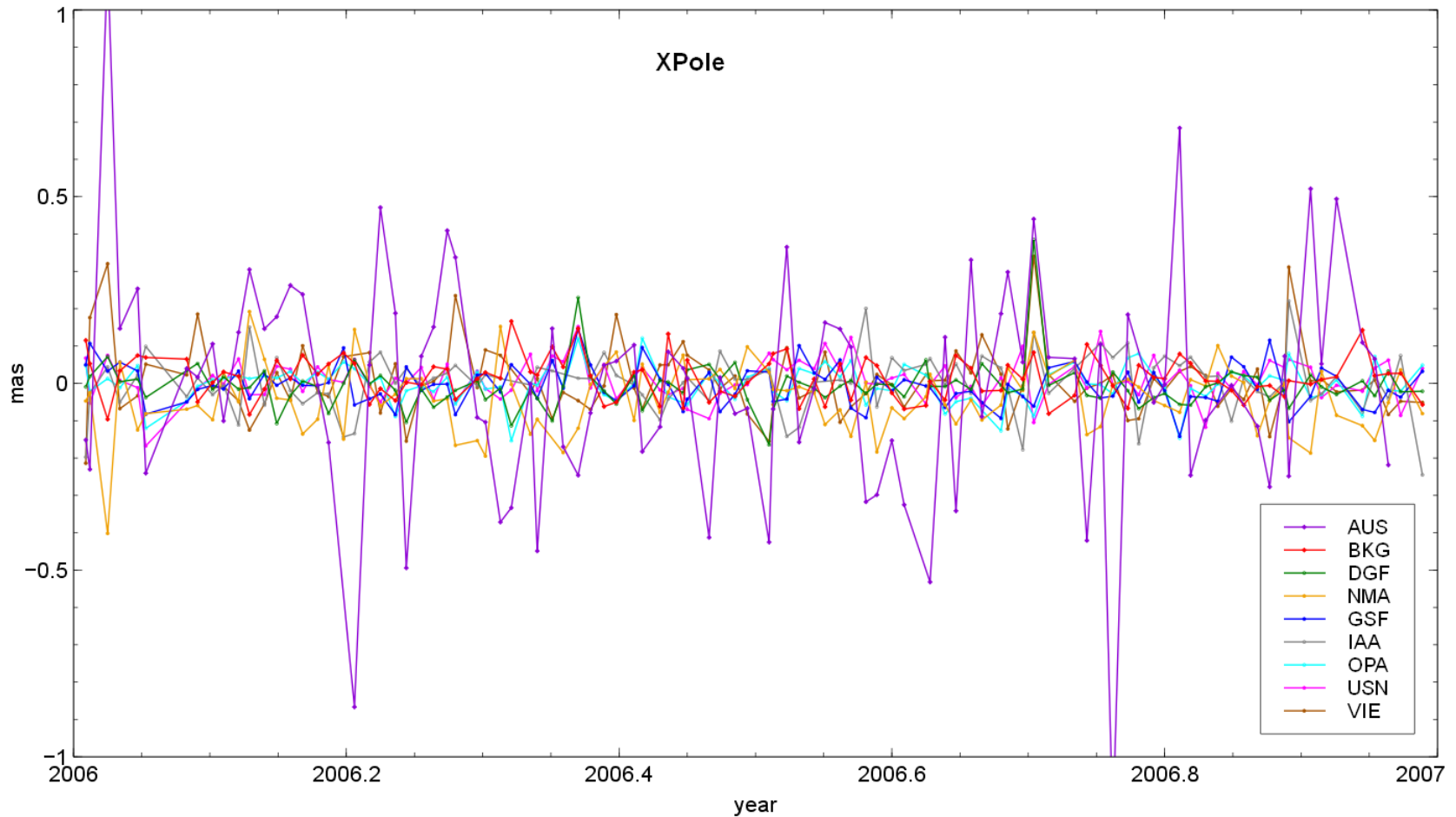
## Not so good news 👎

- Only two contributions in the IVS data center until now (status February 27, 2014)
- No combined results so far for the ITRF2013.

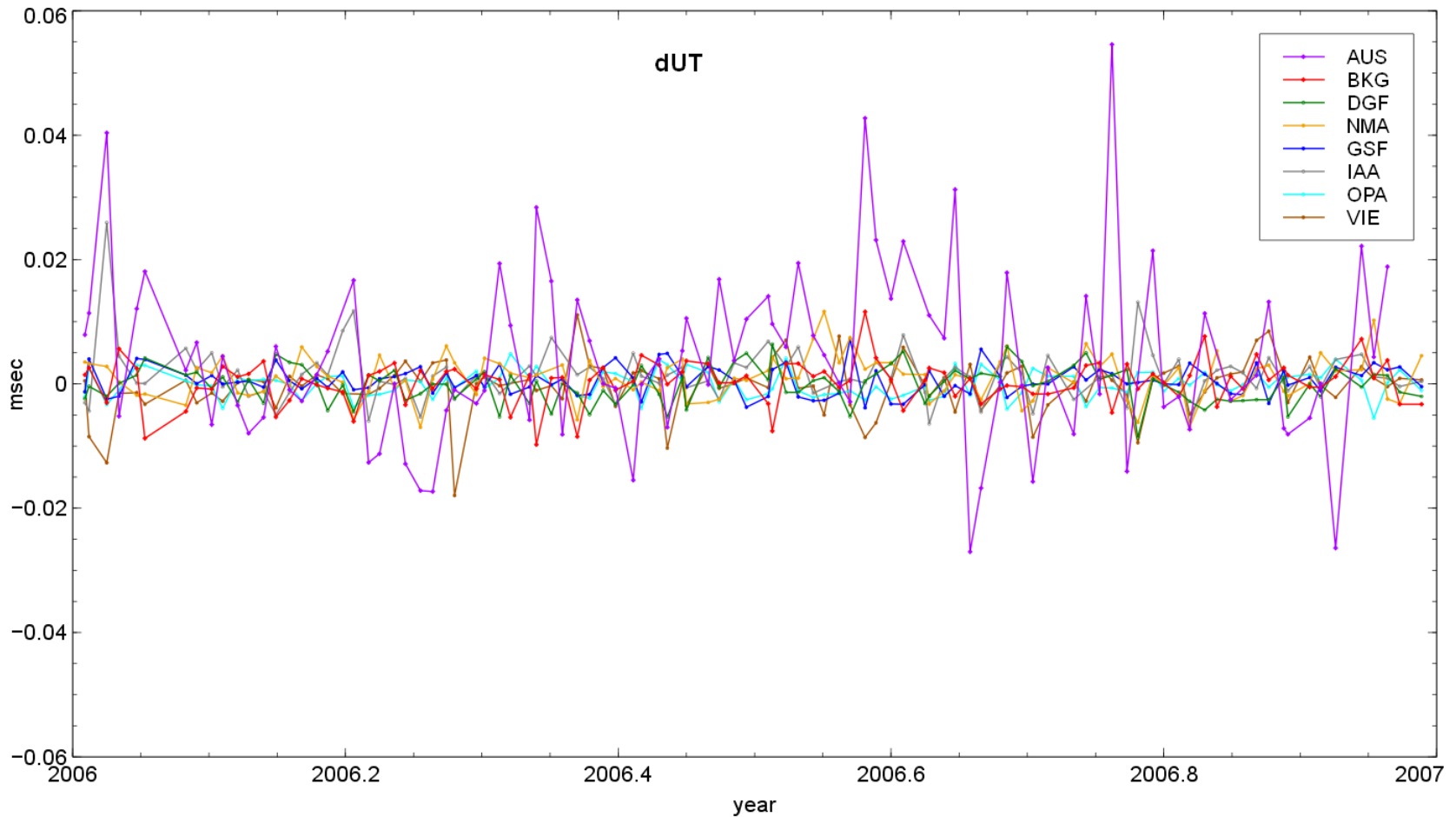
## Good news 👍

- Some new institutions provided test data.
- Combination software has been set up.
- Smaller adjustments of analysis software.
- Common time series for one year for 9 ACs.

# First results X Pole



# First results dUT





# First results

## Some Statistics I

WRMS with respect to the combined solution

	XPole [mas]	YPole [mas]	dUT [msec]	XPole Rate [mas/day]	YPole Rate [mas/day]	LOD [ms/day]	dX [msec]	dY [msec]
AUS	0.183	0.207	0.009	0.386	0.376	0.084	NaN	NaN
<b>BKG</b>	<b>0.046</b>	<b>0.049</b>	<b>0.003</b>	<b>0.171</b>	<b>0.140</b>	<b>0.007</b>	<b>0.047</b>	<b>0.048</b>
DGF	0.030	0.040	0.002	0.136	0.135	0.006	NaN	NaN
<b>GSF</b>	<b>0.044</b>	<b>0.036</b>	<b>0.002</b>	<b>0.124</b>	<b>0.112</b>	<b>0.005</b>	<b>0.029</b>	<b>0.031</b>
IAA	0.058	0.059	0.003	0.190	0.206	0.012	0.050	0.041
NMA	0.064	0.068	0.003	0.219	0.214	0.026	0.050	0.044
<b>OPA</b>	<b>0.042</b>	<b>0.039</b>	<b>0.002</b>	<b>0.120</b>	<b>0.104</b>	<b>0.004</b>	<b>0.026</b>	<b>0.032</b>
<b>USN</b>	<b>0.049</b>	<b>0.068</b>	<b>0.007</b>	<b>0.183</b>	<b>0.157</b>	<b>0.008</b>	<b>0.044</b>	<b>0.055</b>
VIE	0.058	0.051	0.003	0.195	0.172	0.009	0.063	0.058

# First results

## Some Statistics II

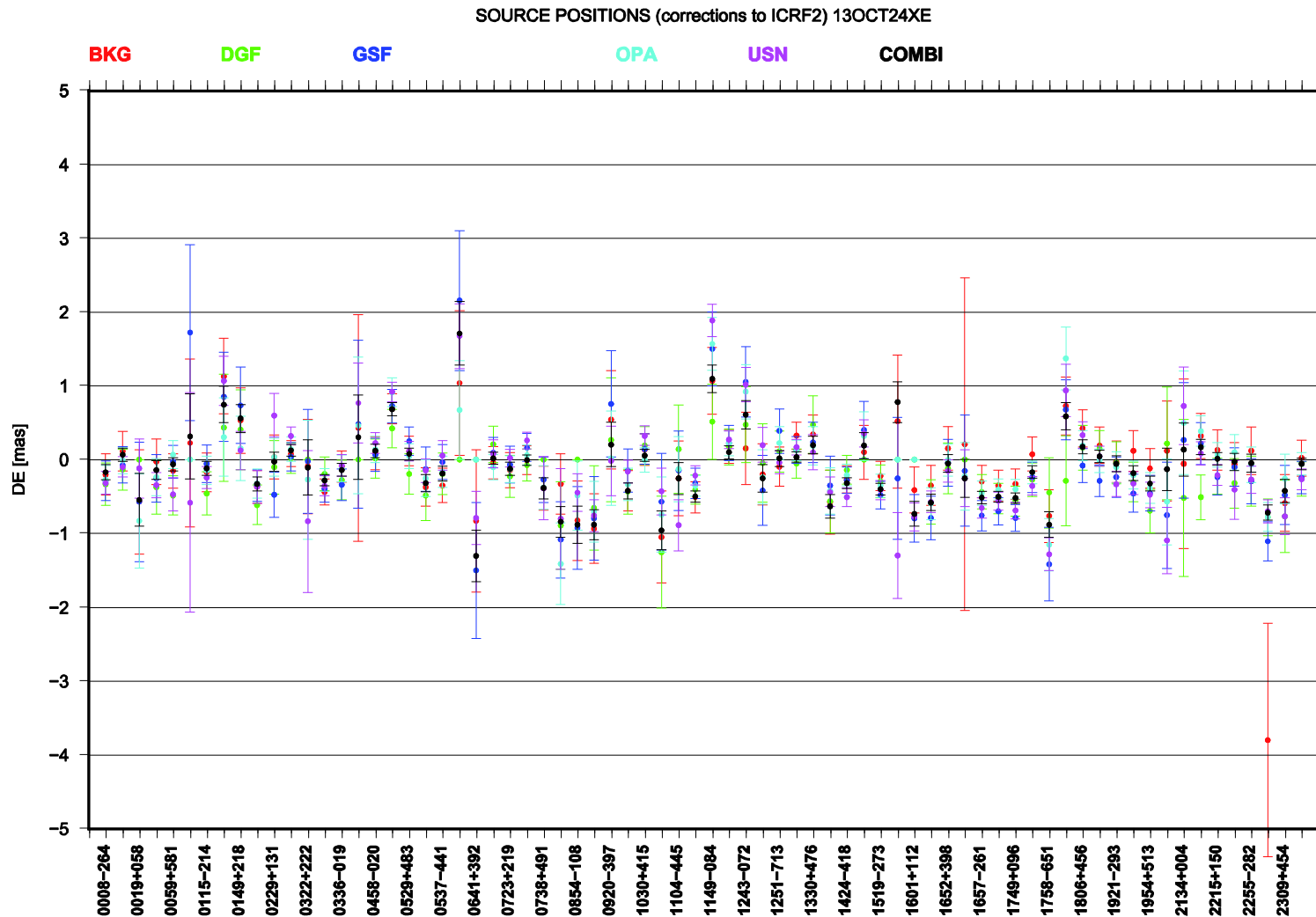
WRMS with respect to the C04 series

	XPole [mas]	YPole [mas]	dUT [msec]	XPole Rate [mas/day]	YPole Rate [mas/day]	LOD [ms/day]	dX [msec]	dY [msec]
AUS	0.254	0.362	0.011	0.469	0.574	0.065	NaN	NaN
<b>BKG</b>	<b>0.097</b>	<b>0.112</b>	<b>0.005</b>	<b>0.316</b>	<b>0.263</b>	<b>0.020</b>	<b>0.057</b>	<b>0.055</b>
COMBI	0.077	0.098	0.004	0.201	0.198	0.019	0.044	0.041
DGF	0.080	0.102	0.005	0.257	0.254	0.021	NaN	NaN
<b>GSF</b>	<b>0.091</b>	<b>0.093</b>	<b>0.005</b>	<b>0.247</b>	<b>0.233</b>	<b>0.020</b>	<b>0.048</b>	<b>0.057</b>
IAA	0.086	0.117	0.006	0.296	0.303	0.021	0.067	0.064
NMA	0.055	0.108	0.005	0.092	0.087	0.025	0.019	0.016
<b>OPA</b>	<b>0.090</b>	<b>0.104</b>	<b>0.005</b>	<b>0.257</b>	<b>0.258</b>	<b>0.021</b>	<b>0.055</b>	<b>0.058</b>
<b>USN</b>	<b>0.093</b>	<b>0.101</b>	<b>0.005</b>	<b>0.276</b>	<b>0.286</b>	<b>0.022</b>	<b>0.068</b>	<b>0.073</b>
VIE	0.101	0.110	0.006	0.313	0.286	0.024	0.090	0.082

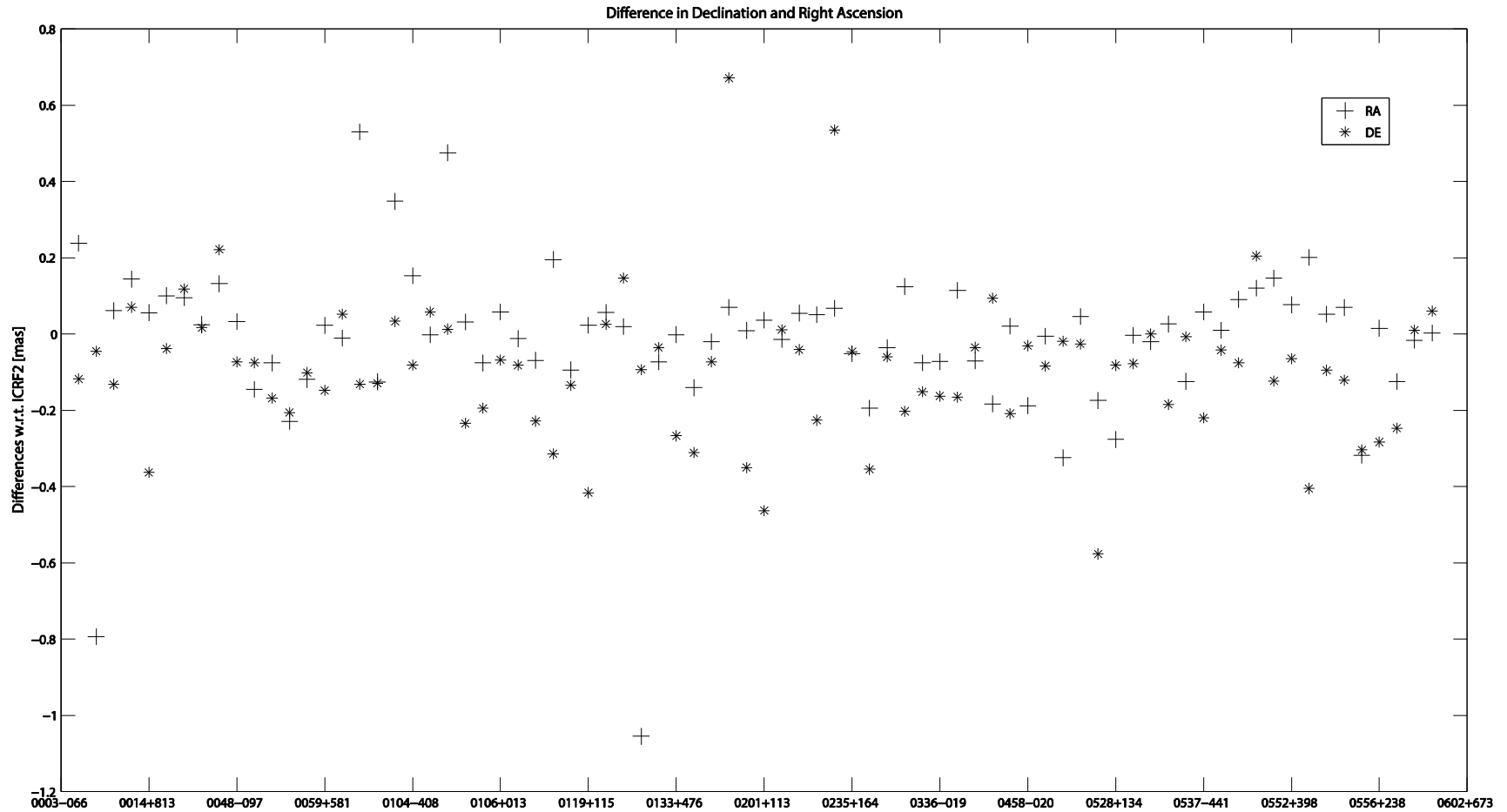
# Combination of source positions

- Source positions are provided by most of the IVS Analysis Centers now.
- Initially foreseen for the ITRF2013.
- Combination routines have been set up to include them.
- First sessions have been combined with good results.
- Combination of single sessions and global solution (CRF).
- Differences to ICRF2 positions +/- 0.2 mas.

# Combination of source positions I



# Combination of source positions II



# Summary

## ITRF2013 Preparations:

- Test data available.
- Promising contributions from new institutions.
- First contributions submitted to IVS data center.
- Combined solutions expected for EGU 2014.

## Source position combination:

- Originally previewed for ITRF2013 contribution (“wish list”).
- Integrated in the combination routines.
- Further investigations foreseen.

# Thank you for your kind attention!

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